



# *DC* Protein Assay Instruction Manual

For Technical Service  
Call Your Local Bio-Rad Office or  
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(1-800-424-6723)

**BIO-RAD**

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## Section 1

### Introduction and Principle

The Bio-Rad *DC* Protein Assay is a colorimetric assay for protein concentration following detergent solubilization. The reaction is similar to the well-documented Lowry<sup>1</sup> assay, but with the following improvements: The reaction reaches 90% of its maximum color development within 15 minutes thereby saving valuable time, and the color changes not more than 5% in 1 hour or 10% in 2 hours after the addition of reagents.

The assay is based on the reaction of protein with an alkaline copper tartrate solution and Folin reagent. As with the Lowry assay, there are two steps which lead to color development: The reaction between protein and copper in an alkaline medium, and the subsequent reduction of Folin reagent by the copper-treated protein.<sup>1</sup> Color development is primarily due to the amino acids tyrosine and tryptophan, and to a lesser extent, cystine, cysteine, and histidine.<sup>1,2</sup> Proteins effect a reduction of the Folin reagent by loss of 1, 2, or 3 oxygen atoms, thereby producing one or more of several possible reduced species which have a characteristic blue color with maximum absorbance at 750 nm and minimum absorbance at 405 nm.<sup>2</sup>

## Section 2

### Product Description

Reagent package (catalog number 500-0116) includes:

- 250 ml REAGENT A, an alkaline copper tartrate solution
- 2000 ml REAGENT B, a dilute Folin Reagent
- 5 ml REAGENT S
- (Sufficient for 500 standard assays or 10,000 microplate assays)

The reagent package may be purchased as a kit with a bovine gamma globulin standard (kit catalog number 500-0111) or bovine serum albumin standard (kit catalog number 500-0112).

## Section 3

### Materials Required but Not Supplied

For standard assay:

- 13 x 100 mm test tubes
- Reservoir for working reagent (size depends on amount of reagent that will be prepared)
- Pipets accurately delivering 100  $\mu$ l, 500  $\mu$ l, and 4.0 ml
- Graduated cylinders or pipets for reagent preparation
- Spectrophotometer set to 750 nm

Vortex mixer

Plastic or glass cuvettes with 1 cm path length matched to laboratory spectrophotometer

Test tube rack to hold 13 x 100 mm test tubes

For microplate assay:

Microtiter plates

Reservoir for working reagent

Pipets for reagent preparation

Pipets accurately delivering 5  $\mu$ l, 25  $\mu$ l, and 200  $\mu$ l

Microplate reader set to 750 nm

### 3.1 Safety Considerations

Eye protection and gloves should be worn while using this product. Consult MSDS at the end of this manual for additional information.

## Section 4 Reagent Compatibility

The listed compounds were tested and found to be compatible with the Bio-Rad DC Protein Assay. In some cases, the presence of one or more of these substances will effect a change in the response of the protein to the assay reagents; therefore, the standard should **always** be prepared in the same buffer as the sample.

10% SDS	1% CHAPS	2% NP-40
1% Triton <sup>†</sup> X-100	1% CHAPSO	1% Thesit <sup>†</sup>
1% Tween <sup>†</sup> 20	1% Octyl glucoside	1% Brij <sup>†</sup> -35
0.2% C <sub>12</sub> E <sub>8</sub> <sup>*</sup>	0.1 M Tris, pH 8	0.5 M NaOH
0.5 M HCl	0.5 M (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	0.025 M EDTA
0.05 M CaCl <sub>2</sub>	0.4 M Guanidine HCl	4 M Urea
0.05% Sodium azide	1 mM DTT (dithiothreitol)	

Note: The DC Protein Assay is incompatible with 2-mercaptoethanol (BME)

<sup>†</sup> BRIJ and TWEEN are registered trademarks of Atlas Chemical. THESIT is a registered trademark of Desitin Arzneimittel GMBH. TRITON is a registered trademark of Rohm and Haas.

<sup>\*</sup>octaethyleneglycol dodecyl ether

## Section 5 Instructions

### 5.1 Standard Assay Protocol

#### 1. Preparation of working reagent

Add 20  $\mu$ l of reagent S to each ml of reagent A that will be needed for the run. (This **working reagent A'** is stable for one week even though a precipitate will form after one day. If precipitate forms, warm the solution and vortex. Do not pipet the undissolved precipitate, as this will likely plug the tip of the pipet, thereby altering the volume of reagent that is added to the sample.)

If samples do not contain detergent, you may omit step #1 and simply use reagent A as supplied.

2. Prepare 3 - 5 dilutions of a protein standard containing from 0.2 mg/ml to about 1.5 mg/ml protein. A standard curve should be prepared each time the assay is performed. *For best results, the standards should always be prepared in the same buffer as the sample.*
3. Pipet 100  $\mu$ l of standards and samples into clean, dry test tubes.
4. Add 500  $\mu$ l of reagent A' or A (see note from step 1) into each test tube. Vortex.
5. Add 4.0 ml reagent B into each test tube and vortex immediately.
6. After 15 minutes, absorbances can be read at 750 nm. The absorbances will be stable at least 1 hour. (See Troubleshooting Guide for recommendation on using a wavelength other than 750 nm.)

### 5.2 Microplate Assay Protocol

#### 1. Preparation of working reagent

Add 20  $\mu$ l of reagent S to each ml of reagent A that will be needed for the run. (This **working reagent A'** is stable for 1 week even though a precipitate will form after 1 day. If precipitate forms, warm the solution and vortex. Do not pipet the undissolved precipitate, as this will likely plug the tip of the pipet, thereby altering the volume of reagent that is added to the sample.)

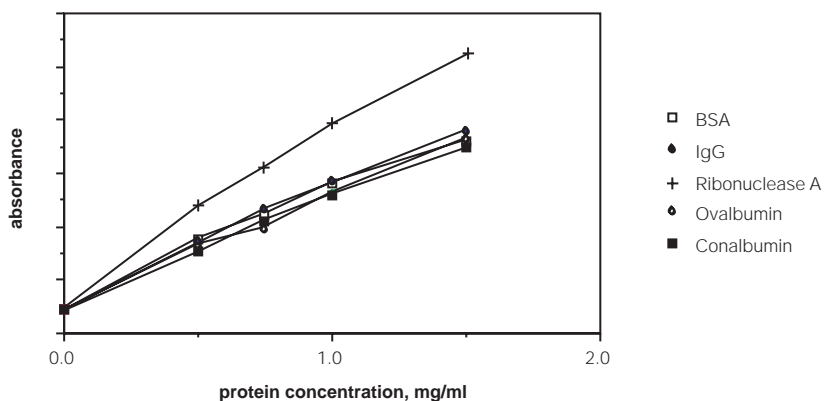
If samples do not contain detergent, you may omit step #1 and simply use reagent A as supplied.

2. Prepare 3 - 5 dilutions of a protein standard containing from 0.2 mg/ml to about 1.5 mg/ml protein. A standard curve should be prepared each time the assay is performed. *For best results, the standard should be prepared in the same buffer as the sample.*
3. Pipet 5  $\mu$ l of standards and samples into a clean, dry microtiter plate.

4. Add 25  $\mu\text{l}$  of reagent A' or reagent A (see note from step 1) into each well.
5. Add 200  $\mu\text{l}$  reagent B into each well. If microplate reader has a mixing function available, place plate in reader and let the plate mix for 5 seconds. If not, gently agitate the plate to mix the reagents. If bubbles form, pop them with a clean, dry pipet tip. Be careful to avoid cross-contamination of sample wells.
6. After 15 minutes, absorbances can be read at 750 nm. The absorbances will be stable for about 1 hour. (See Troubleshooting Guide for recommendation on using a wavelength other than 750 nm.)

## Section 6 Response of Various Proteins

As with any colorimetric assay, different proteins will elicit greater or lesser color formation. The following proteins have been assayed with the protein assay. As demonstrated by the graph, there is a slight variation in color development with different proteins.



## Section 7 Storage

Lyophilized preparations of Protein Standard I (bovine gamma globulin) and Protein Standard II (bovine serum albumin), if included, should be refrigerated upon arrival. These lyophilized preparations have a shelf life of one year at 4 °C. Rehydrated and stored at 4 °C, the protein solutions should be used within 60 days. Rehydrated and stored at -20 °C, the protein solutions should be used within 6 months.

REAGENT A, REAGENT B, and REAGENT S should be stored away from direct sunlight at room temperature (25-30 °C). (Reagents A and B may also be stored in the refrigerator.) All reagents are good for 6 months from date of purchase.

## Section 8

### Troubleshooting Guide

1. The buffer that I normally use is not listed in the reagent compatibility list. How will I know if it interferes with the assay?

It is best to run two standard curves: One with protein in the same buffer as your sample and one with protein in water and then plot a graph of protein concentration vs. absorbance. If the buffer does not interfere, the two graphs of the standard curve will have identical slope. Partial interference can be compensated for by adding the buffer or interfering component to the standard curve for the actual protein assay.
2. My sample is a mixture of proteins. Which standard should I use for the standard curve?

In any protein assay, the best protein to use as a standard is a purified preparation of the protein being assayed. In the absence of such an absolute reference protein, one must select another protein as a relative standard. The best relative standard to use is one which gives a color yield similar to that of the protein being assayed.

Any purified protein can be selected as a reference standard if only relative protein values are desired. Bio-Rad offers two standards: bovine gamma globulin (Standard I, catalog number 500-0005) and bovine serum albumin (Standard II, catalog number 500-0007).
3. Is any sample preparation required?

In general, no. However, the protein must be solubilized. (The sample can not be a suspension or an unfiltered homogenate.)
4. May I use a wavelength other than 750 nm?

Yes. Absorbance can be measured at 650-750 nm.
5. May I store the reagents in the refrigerator?

Yes, but all components must be warmed to 25-30 °C prior to use. Reagent S will develop a precipitate during cold room storage. Warming to 37 °C for 5 minutes will dissolve the precipitate.

## Section 9 Ordering Information

<b>Catalog Number</b>	<b>Product Description</b>
500-0111	<b>Bio-Rad DC Protein Assay Kit I</b> , includes contents of Reagents Package and bovine gamma globulin standard
500-0112	<b>Bio-Rad DC Protein Assay Kit II</b> , includes contents of Reagents Package and bovine serum albumin standard
500-0116	<b>Bio-Rad DC Protein Assay Reagents Package</b> , does not include a standard

## Section 10 Related Materials

<b>Catalog Number</b>	<b>Product Description</b>
500-0001	<b>Bio-Rad Protein Assay Kit I</b> , 450 ml dye reagent concentrate and bovine gamma globulin standard for general use, based on Bradford method
500-0002	<b>Bio-Rad Protein Assay Kit II</b> , 450 ml dye reagent concentrate and bovine serum albumin standard for general use, based on Bradford method
500-0006	<b>Bio-Rad Protein Assay Dye Reagent Concentrate</b> , 450 ml dye reagent concentrate supplied without a standard, based on Bradford method
500-0005	<b>Protein Standard I</b> , bovine gamma globulin
500-0007	<b>Protein Standard II</b> , bovine serum albumin
223-9950	<b>Disposable Polystyrene Cuvettes</b> , 100 -3.5 ml cuvettes
224-0096	<b>Costar 96 Well Flat Bottom EIA Plate</b> , polystyrene microtiter plates, 5 per package, carton of 100
170-6601	<b>Model 3550 Microplate Reader</b> , 100/120 VAC
170-6602	<b>Model 3550 Microplate Reader</b> , 220/240 VAC
170-6621	<b>Model 450 Microplate Reader</b> , 100/120 VAC
170-6622	<b>Model 450 Microplate Reader</b> , 220/240 VAC

For information on Bio-Rad's extensive Microplate Data Analysis Systems, please call 800/4-BIORAD in the U.S., or contact your local Bio-Rad Representative.



## Section 11

### References

1. Lowry, O. H., Rosebrough, N. J., Farr, A. L., and Randall, R. J., "Protein Measurement with the Folin Phenol Reagent," *Journal of Biological Chemistry*, **193** (1951): 265-275.
2. Peterson, Gary L., "Review of the Folin Phenol Protein Quantitation Method of Lowry, Rosebrough, Farr, and Randall," *Analytical Biochemistry*, **100** (1979): 201-220.

# Section 12 Material Safety Data Sheets

## I. PRODUCT IDENTIFICATION

**TRADE NAME:** DC PROTEIN ASSAY REAGENT A

**Catalog No.:** Used in Kits: 500-0111, 500-0112, and 500-0116

**Chemical identity, Common names:** SODIUM HYDROXIDE, Caustic soda, lye.

**Formula:** NaOH, a caustic.

**M.W.:** 40.00

**MANUFACTURER'S NAME:**

**BIO-RAD LABORATORIES**

**LIFE SCIENCE GROUP**

**2000 ALFRED NOBEL DRIVE**

**HERCULES, CA 94547**

**EMERGENCY PHONE No.:**

**510/232-7000**

DATE PREPARED OR REVISED: 2/3/95

NAME OF PREPARER: ROY WOOD

## II. HAZARDOUS INGREDIENTS

<u>CHEMICAL NAMES</u>	<u>CAS NUMBERS</u>	<u>PERCENT</u>	<u>EXPOSURE LIMITS IN AIR</u>		
			<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER</u>
Sodium Hydroxide	1310-73-2	1-5%*	—	2 mg/m <sup>3</sup>	—

\*Aqueous solution also containing less than 1% sodium tartrate and less than .1% copper sulfate.

## III. PHYSICAL/CHEMICAL CHARACTERISTICS

**BOILING POINT:** 100 °C

**SPECIFIC GRAVITY**(H<sub>2</sub>O = 1): 1

**VAPOR PRESSURE:** N/A

**MELTING POINT:** N/A

**VAPOR DENSITY(AIR = 1):** N/A

**EVAPORATION RATE (BUTYL ACETATE = 1):** N/A

**SOLUBILITY IN WATER:** Infinite.

**APPEARANCE AND COLOR:** Pale blue liquid.

## IV. FIRE AND EXPLOSION HAZARD DATA

**FLASH POINT:** N/A

**FLAMMABLE LIMITS:** N/A

(METHOD USED): N/A

**EXTINGUISHING MEDIA:** Not required. Use media suitable for surrounding materials.

**SPECIAL FIRE FIGHTING PROCEDURES:** In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** None expected .

## V. HEALTH HAZARD INFORMATION

### SYMPTOMS OF OVEREXPOSURE (for each potential route of exposure):

**INHALED:** Corrosive! Inhalation not likely due to nature of the product. If product dries out, the inhaled sodium hydroxide dust may be fatal as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.

**CONTACT WITH SKIN OR EYES:** Corrosive! Extremely destructive to tissue of the skin and eyes. May cause irritation of eyes and with greater exposures, severe burns with possibility of blindness resulting.

**ABSORBED THROUGH SKIN:** Corrosive! Destructive to skin on contact can cause irritation or severe burns and scarring with greater exposures.

**SWALLOWED:** Corrosive! DANGER: May be fatal if swallowed. Causes severe burns. Sodium hydroxide is classified as a poison under Federal Caustic Poison Act.

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### HEALTH EFFECTS OR RISKS FROM EXPOSURE

**ACUTE:** Corrosive! Causes severe burns. See above.

**CHRONIC:** Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.

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### FIRST AID: EMERGENCY PROCEDURES

**EYE CONTACT:** Flush with large amounts of water for at least 15 minutes, lifting the upper and lower lids occasionally. Get immediate medical attention.

**SKIN CONTACT:** Flush skin with large amounts of water for at least 15 minutes, while removing contaminated clothing and shoes. Wash clothes before reuse. Get medical attention.

**INHALED:** Remove to fresh air. If not breathing, give artificial respiration. Get immediate medical attention.

**SWALLOWED:** DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

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### SUSPECTED CANCER AGENT

X  NO: THIS PRODUCT'S INGREDIENTS ARE NOT FOUND IN THE LISTS BELOW.

YES: \_\_\_ FEDERAL OSHA \_\_\_ NTP \_\_\_ IARC

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of this substance.

## VI. REACTIVITY DATA

**STABLE**  X

**UNSTABLE** \_\_\_

**CONDITIONS TO AVOID:** NA

**INCOMPATIBILITY**(Materials to avoid): Strong acid solutions, organic halogen compounds, and nitromethane.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Sodium oxide.

**HAZARDOUS POLYMERIZATION** MAY OCCUR \_\_\_ WILL NOT OCCUR  X

**CONDITIONS TO AVOID:** N/A

## VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

**SPILL RESPONSE PROCEDURES:** CAUTION: Caustic material. Cover spill with adsorbent and collect for solid waste disposal.

**PREPARING WASTES FOR DISPOSAL:** Comply with all applicable federal, state, and local regulations on spill reporting, waste handling, and waste disposal.

## VIII. SPECIAL HANDLING INFORMATION

**VENTILATION AND ENGINEERING CONTROLS:** In general, dilution ventilation is a satisfactory health hazard control for this substance.

**RESPIRATORY CONTROLS:** This product is a liquid and does not contain volatile organics and should not require any special respiratory controls. Respiratory controls may be required for protection against other chemicals being used in the same area.

**EYE PROTECTION:** Use chemical safety goggles. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

**GLOVES:** Chemical resistant gloves such as neoprene.

**OTHER CLOTHING AND EQUIPMENT:** Lab coat or apron.

**WORK PRACTICES, HYGIENIC PRACTICES:** Use good laboratory practices. Wash hands after using and before eating. Do not eat, drink, or smoke in the work area.

**OTHER HANDLING AND STORAGE REQUIREMENTS:** Keep in a tightly closed container to protect product quality. Store in a cool, dry, ventilated area.

**PROTECTIVE MEASURES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:**

Protective clothing, eyewear and appropriate NIOSH-approved respiratory protection should be worn.

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We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and conditions of use of the product are not within the control of Bio-Rad, it is the user's responsibility to handle the product under conditions of safe use.

## I. PRODUCT IDENTIFICATION

**TRADE NAME:** DC PROTEIN ASSAY REAGENT B

**Catalog No.:** Used in Kits: 500-0111, 500-0112, and 500-0116

**Chemical identity, Common names:** FOLIN REAGENT.

**Formula:** MIXTURE

**M.W.:** NA

**MANUFACTURER'S NAME:**

**BIO-RAD LABORATORIES**

**LIFE SCIENCE GROUP**

**2000 ALFRED NOBEL DRIVE**

**HERCULES, CA 94547**

**EMERGENCY PHONE No.:**

**510/232-7000**

DATE PREPARED OR REVISED: 2/3/95

NAME OF PREPARER: ROY WOOD

## II. HAZARDOUS INGREDIENTS

<u>CHEMICAL NAMES</u>	<u>CAS NUMBERS</u>	<u>PERCENT</u>	<u>EXPOSURE LIMITS IN AIR</u>	
			<u>ACGIH TLV</u>	<u>OSHA PEL</u>
REAGENT B is a diluted FOLIN reagent containing less than 1% each of the following ingredients:				
Lithium Sulfate	10377-48-7		no data found	
Tungstic acid, sodium salt	10213-10-2	1 mg/m <sup>3</sup>		1 mg/m <sup>3</sup> (TWA)
Molybdcic acid, sodium salt	10102-40-6	5 mg/m <sup>3</sup>		5 mg/m <sup>3</sup>
Hydrochloric acid	7647-01-0	7.5 mg/m <sup>3</sup>		7 mg/m <sup>3</sup>
Phosphoric acid	7664-38-2	1 mg/m <sup>3</sup>		1 mg/m <sup>3</sup>

## III. PHYSICAL/CHEMICAL CHARACTERISTICS

**BOILING POINT:** 100 °C (water)

**VAPOR PRESSURE:** NA

**VAPOR DENSITY(AIR = 1):** NA

**ODOR:** odorless

**APPEARANCE AND COLOR:** Clear liquid.

**SPECIFIC GRAVITY**(H<sub>2</sub>O = 1): 1

**MELTING POINT:** NA

**EVAPORATION RATE (BUTYL ACETATE = 1):** NA

**SOLUBILITY IN WATER:** infinite

## IV. FIRE AND EXPLOSION HAZARD DATA

**FLASH POINT:** NA

(METHOD USED): NA

**FLAMMABLE LIMITS:** NA

**EXTINGUISHING MEDIA:** Nothing special required. Use media suitable for surrounding materials.

**SPECIAL FIRE FIGHTING PROCEDURES:** For surrounding fire wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** No special hazards known.

## V. HEALTH HAZARD INFORMATION

**SYMPTOMS OF OVEREXPOSURE** (for each potential route of exposure):

**INHALED:** Not expected due to nature of product.

**CONTACT WITH SKIN OR EYES:** Would be irritating to eyes.

**ABSORBED THROUGH SKIN:** Could be mildly irritating to skin.

**SWALLOWED:** Large doses may cause gastrointestinal distress.

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### HEALTH EFFECTS OR RISKS FROM EXPOSURE

**ACUTE:** Contains dilute acids. Could be a mild irritant. The concentration of all the ingredients are less than 1% each. There is no specific information available for diluted FOLIN reagent. The diluted solution does contain dilute acids and heavy metals: SAX, 5th Ed. lists Molybdenum as "slightly toxic" and tungsten is listed as somewhat more toxic than molybdenum but "does not constitute an important health hazard".

**CHRONIC:** To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated for FOLIN reagent.

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### FIRST AID: EMERGENCY PROCEDURES

**EYE CONTACT:** Flush with large volumes of water for at least 15 minutes, lifting the upper and lower lids occasionally. Get medical attention.

**SKIN CONTACT:** Remove any contaminated clothing. Wash skin with plenty of flowing water for at least 15 minutes. If irritation develops, get medical attention.

**INHALED:** Remove to fresh air. Get medical attention for any breathing difficulty.

**SWALLOWED:** Induce vomiting by giving two glasses of water, or milk if available and sticking finger down throat. Call a physician immediately. Never give anything by mouth to an unconscious person.

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### SUSPECTED CANCER AGENT

X  NO: THIS PRODUCT'S INGREDIENTS ARE NOT FOUND IN THE LISTS BELOW.

YES: \_\_\_\_\_FEDERAL OSHA \_\_\_\_\_NTP \_\_\_\_\_IARC

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### MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

No information found.

## VI. REACTIVITY DATA

**STABLE**  X

**UNSTABLE** \_\_\_\_\_

**CONDITIONS TO AVOID:** N/A

**INCOMPATIBILITY** (Materials to avoid): Strong oxidizers.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Upon dehydration oxides of phosphorous and hydrogen chloride gas may form.

**HAZARDOUS POLYMERIZATION** MAY OCCUR \_\_\_\_\_ WILL NOT OCCUR  X

**CONDITIONS TO AVOID:** N/A

## VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

**SPILL RESPONSE PROCEDURES:** Cover spill with a sorbent and collect for solid waste disposal.

**PREPARING WASTES FOR DISPOSAL:** Comply with all applicable federal, state, and local regulations on spill reporting waste handling, and waste disposal.

## VIII. SPECIAL HANDLING INFORMATION

**VENTILATION AND ENGINEERING CONTROLS:** In general, good ventilation is sufficient. However, if conditions of use create discomfort to the worker a local exhaust system should be considered.

**RESPIRATORY CONTROLS:** Should not be required for this product.

**EYE PROTECTION:** Chemical safety goggles.

**GLOVES:** Use chemical resistant gloves such as neoprene.

**OTHER CLOTHING AND EQUIPMENT:** Wear lab coat or apron.

**WORK PRACTICES, HYGIENIC PRACTICES:** Use good laboratory practices. Wash hands after using and before eating. Do not eat, drink, or smoke in the work area.

**OTHER HANDLING AND STORAGE REQUIREMENTS:** Keep tightly sealed to protect quality. Store in a cool, dry, ventilated area.

**PROTECTIVE MEASURES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:**

Proper protective clothing, eye protection, and respiratory equipment should be worn.

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We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and conditions of use of the product are not within the control of Bio-Rad, it is the user's responsibility to handle the product under conditions of safe use.

# 1. PRODUCT IDENTIFICATION

**TRADE NAME:** DC PROTEIN ASSAY REAGENT S

**Catalog No.:** Used in Kits: 500-0111, 500-0112, and 500-0116

**Chemical identity, Common names:** Sodium dodecyl sulfate.

**Formula:**  $C_{12}H_{25}NaO_4S$

**M.W.:** 288.38

**MANUFACTURER'S NAME:**

**BIO-RAD LABORATORIES**

**LIFE SCIENCE GROUP**

**2000 ALFRED NOBEL DRIVE**

**HERCULES, CA 94547**

**EMERGENCY PHONE No.:**

**510/232-7000**

DATE PREPARED OR REVISED: 2/3/95

NAME OF PREPARER: ROY WOOD

# II. HAZARDOUS INGREDIENTS

<u>CHEMICAL NAMES</u>	<u>CAS NUMBERS</u>	<u>PERCENT</u>	<u>EXPOSURE LIMITS IN AIR</u>		
			<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER</u>
sodium dodecyl sulfate	151-21-3	5-10% <sup>†</sup>		no data found *	

<sup>†</sup>Aqueous solution. Data given is for 100% SDS unless otherwise noted.

\*orl-rat LD50: 1288 mg/kg

# III. PHYSICAL/CHEMICAL CHARACTERISTICS

**BOILING POINT:** 100 °C (water)

**VAPOR PRESSURE:** N/A

**VAPOR DENSITY(AIR = 1):** N/A

**ODOR:** Slight fatty odor

**APPEARANCE AND COLOR:** Clear liquid.

**SPECIFIC GRAVITY** ( $H_2O = 1$ ): N/A

**MELTING POINT:** 200 °C (362 °F) decomposes

**EVAPORATION RATE (BUTYL ACETATE = 1):** N/A

**SOLUBILITY IN WATER:** 0.1 g/ml

# IV. FIRE AND EXPLOSION HAZARD DATA

**FLASH POINT:** N/A

(METHOD USED): N/A

**FLAMMABLE LIMITS:** N/A

**EXTINGUISHING MEDIA:** Water spray, dry chemical, alcohol foam, or carbon dioxide.

**SPECIAL FIRE FIGHTING PROCEDURES:** As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.



## V. HEALTH HAZARD INFORMATION

### **SYMPTOMS OF OVEREXPOSURE (for each potential route of exposure):**

**INHALED:** Not expected due to nature of product. However, it dried out the powder causes irritation of mucous membranes, throat and respiratory tract. Symptoms of sore throat, coughing, and choking can occur.

**CONTACT WITH SKIN OR EYES:** Irritating to eye tissue with redness and pain.

**ABSORBED THROUGH SKIN:** Mildly irritating to skin, causes a rash on continued exposure.

**SWALLOWED:** Large doses may cause gastrointestinal distress.

### **HEALTH EFFECTS OR RISKS FROM EXPOSURE**

**ACUTE:** See above.

**CHRONIC:** To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

### **FIRST AID: EMERGENCY PROCEDURES**

**EYE CONTACT:** Flush with large volumes of water for at least 15 minutes, lifting the upper and lower lids occasionally. Get medical attention.

**SKIN CONTACT:** Remove any contaminated clothing. Wash skin with plenty of flowing water for at least 15 minutes. If irritation develops, get medical attention.

**INHALED:** Remove to fresh air. Get medical attention for any breathing difficulty.

**SWALLOWED:** Induce vomiting by giving two glasses of water, or milk if available and sticking finger down throat. Call a physician immediately. Never give anything by mouth to an unconscious person.

### **SUSPECTED CANCER AGENT**

X  NO: THIS PRODUCT'S INGREDIENTS ARE NOT FOUND IN THE LISTS BELOW.

YES:   FEDERAL OSHA   NTP   IARC

### **MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:**

No information found.

## VI. REACTIVITY DATA

**STABLE**  X

**UNSTABLE**

**CONDITIONS TO AVOID:** N/A

**INCOMPATIBILITY** (Materials to avoid): Strong oxidizers.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Oxides of sulfur and hydrogen sulfide.

**HAZARDOUS POLYMERIZATION MAY OCCUR**   WILL NOT OCCUR  X

**CONDITIONS TO AVOID:** N/A

## VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

**SPILL RESPONSE PROCEDURES:** Caution, may be slippery. Small spill may be cleaned up with a sponge and water washed down the drain.

**PREPARING WASTES FOR DISPOSAL:** Comply with all applicable federal, state, and local regulations on spill reporting waste handling, and waste disposal.

## VIII. SPECIAL HANDLING INFORMATION

**VENTILATION AND ENGINEERING CONTROLS:** In general, good ventilation is sufficient. However, if conditions of use create discomfort to the worker a local exhaust system should be considered.

**RESPIRATORY CONTROLS:** Should not be required for this product.

**EYE PROTECTION:** Chemical safety goggles.

**GLOVES:** Use chemical resistant gloves such as neoprene.

**OTHER CLOTHING AND EQUIPMENT:** Wear lab coat or apron.

**WORK PRACTICES, HYGIENIC PRACTICES:** Use good laboratory practices. Wash hands after using and before eating. Do not eat, drink, or smoke in the work area.

**OTHER HANDLING AND STORAGE REQUIREMENTS:** Keep tightly sealed to protect quality. Store in a cool, dry, well-ventilated place away from incompatible materials.

**PROTECTIVE MEASURES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:**

Proper protective clothing, eye protection, and respiratory equipment should be worn.

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We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and conditions of use of the product are not within the control of Bio-Rad, it is the user's responsibility to handle the product under conditions of safe use.



**Bio-Rad  
Laboratories**

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*Life Science  
Group*

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